Conceptual Framework and Learning Outcomes for a Technical Assistance Program focused on Computer Tools for Planning, Conservation, and Environmental Protection

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Background

In 2003, the Wisconsin Department of Natural Resources (Wisconsin DNR) prepared a concept paper addressing "Environmental Protection through Sound Land Use Decisions: A Federal-State-Local Partnership." That concept paper defined a set of goals and spelled out a technical assistance program focused on computer tools that could be used to achieve those goals. The envisioned partnership involved on-the-ground outreach and assistance through regional sessions that support and enhance community land use decision making. In 2004, the U.S. Environmental Protection Agency (U.S. EPA) awarded a water quality management planning grant to the Wisconsin DNR under this partnership to build capacity and provide technical assistance focused on computer tools for planning, conservation, and environmental protection.

This document describes the underlying program objectives, target audiences, conceptual framework, and learning outcomes developed by Wisconsin DNR and its partners to carry out this technical assistance program (the Wisconsin DNR technical assistance program). In developing this document and the underlying approach, we relied on a wealth of recent research on educational theory, adult learning and behavior, curriculum planning, and environmental education methodology (see "References and Background Materials" section). We attempted to apply relevant aspects of this work to the planning and development of our technical assistance program.

Contents

Purpose of the Technical Assistance Program

Many types of organizations provide training, technical assistance, or other educational opportunities for adult learners. The centrality of these programs varies with the mission and goals of the organizations. The U.S. EPA and Wisconsin DNR have missions focused primarily on environmental protection and resource management. These agencies view education and training as a means to an end (i.e. environmental results), not necessarily an allied or corollary mission. Effective program planning requires technical assistance providers to recognize the relationship between the overall agency missions and the primary purposes of their educational programs. This section describes briefly agency concerns and summarizes current thinking about the primary purposes of educational programs as a pedagogic context for the Wisconsin DNR technical assistance program.

Overarching Agency Concerns – The U.S. EPA's mission focuses on protecting human health and safeguarding the natural environment. The agency plays a leadership role in advancing environmental science, research, and assessment efforts and works closely with other federal agencies, state and local governments, and Native American Indian tribes to uphold its mission.[1] Similarly, the Wisconsin DNR strives for the preservation, protection, effective management, and maintenance of Wisconsin's natural resources. The agency is responsible for implementing state laws and, where applicable, federal laws that protect and enhance natural resources. It is the one agency charged with full responsibility for coordinating the many disciplines and programs necessary to provide a clean environment and a full range of outdoor recreational opportunities for Wisconsin citizens and visitors.[2]

How we use land and the land use decisions made today are perhaps the most important, long-term environmental issue our nation faces. In 1996 as a response to increasing concerns about the environmental effects of rapid urban and rural growth, the U.S. EPA formed the Smart Growth Network. Through this network, the U.S. EPA works with states and communities to find ways to grow while minimizing environmental and health impacts. Studies have demonstrated that smart growth development approaches have clear environmental benefits, including improved air and water quality, increased wetland preservation, additional brownfield site remediation and reuse, and expanded open space preservation. To encourage smart growth, the U.S. EPA works with others to identify and pursue new policies, facilitate collaboration and communication between varied interests, provide technical assistance, and create incentives for increasing the efficiency of environmental protection.[3] An important part of the U.S. EPA's science-based efforts includes the development and dissemination of computer tools that can support local planning and environmental management efforts.

These federal efforts parallel state efforts begun in the mid-1990s to address land use issues. Among other actions, the state's Natural Resources Board in 1995 adopted two action items affirming a continued commitment to support local land use decision making. These are to:

- develop a cooperative program with other agencies, businesses, organizations, and local governments to share information and increase knowledge on environmental issues and local land use planning and decision making, and
- develop public information and education programs with other agencies and organizations that explain the potential impacts of land use decisions and encourage informed, voluntary actions to minimize negative environmental impacts.[4]

In order to be successful in addressing environmental concerns, the Wisconsin DNR must work with others to help guide development patterns. The Wisconsin DNR technical assistance program reflects this thinking. It also recognizes that increasingly government agencies are harnessing the power of the Internet, geographic information systems (GIS), and related computer technologies to help meet increasing service

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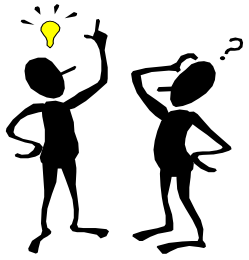
[1] http://www.epa.gov/epahome/aboutepa.htm
[2] http://www.dnr.state.wi.us/aboutdnr/
[3] http://www.smartgrowth.org/sgn/partdes.asp?partid=16&res=800
[4] Action A.2 and Action A.3 from Watermolen, D.J. and S.M. Fenner. 1995. *Common Ground: Report of the DNR Land Use Task Force.* Madison: Wisconsin Department of Natural Resources.

demands and stretch tax payer dollars further. Innovative applications of computer tools are improving citizens' accessibility to information that affects them where they live and work. The technical assistance program also recognizes the central role that computer tools can play in improving local decisions.

The Purposes of Educational Programs – Contemporary program planning literature suggests that organizations conduct adult education and training programs, including technical assistance programs, for five primary purposes:

1. To encourage continuous growth and development of individuals.
2. To assist people in responding to practical problems and issues.
3. To prepare people for current and future work opportunities.
4. To assist organizations in achieving desired results and adapting to change.
5. To provide opportunities to examine community issues, foster change for the common good, and promote a civil society.



The Wisconsin DNR technical assistance program serves several of these program purposes.

One primary program focus is on achieving desired outcomes (i.e. environmental results) and adapting to change (e.g., new regulations). For example, some computer tools allow users to predict changes in the quantity and quality of stormwater runoff resulting from land use modifications. Through the Wisconsin DNR technical assistance program, awareness of and proficiency with these tools can help communities achieve reductions in runoff (environmental results) and compliance with Clean Water Act phase II stormwater rules (new regulations).

Through the technical assistance program, the Wisconsin DNR seeks to provide opportunities for citizens, elected officials, planners, and environmental professionals to examine a variety of local environmental issues. For example, computer tools can be used to address issues like storm water runoff, groundwater recharge, air quality, and brownfields redevelopment. Further, the Wisconsin DNR technical assistance program attempts to "foster change for the common good and promote a civil society" by bringing science-based tools to local decision-making processes. For example, when properly used, computer tools can enhance public participation, community visioning, impact predictions, and the analyses of alternatives.

Because land use issues are inherently local and often quite personal, the technical assistance program addresses practical problems and real-life issues. Participants from each of the target audiences will be able to use a variety of computer tools when carrying out their day-to-day land use and planning activities.

Finally, the Wisconsin DNR technical assistance program compliments the agency's professional development initiatives. The agency endorses training and learning strategies intended to build knowledge, skills, and competencies on a department-wide level. Along these lines, the technical assistance program targets DNR staff in a range of programs statewide.

Target Audiences for Technical Assistance

We identified four target audiences for the Wisconsin DNR technical assistance program:

- University of Wisconsin-Extension (UW-Extension) educators,
- Wisconsin DNR program staff,
- Planners (professional and citizen), and
- Local government decision makers.

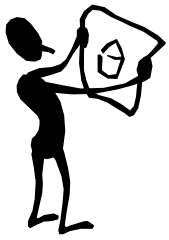
This section briefly describes each of these audiences.

UW-Extension Educators – Through partnerships with 26 University of Wisconsin campuses, counties, tribal governments, and other organizations, the UW-Extension provides a spectrum of lifelong learning opportunities for Wisconsin citizens. The size of the effort is extensive, with more than one million Wisconsin residents participating in outreach programs annually through four divisions: Cooperative Extension, Outreach and E-Learning, Broadcasting and Media Innovations, and Business and Manufacturing Extension. The Wisconsin DNR technical assistance program targets faculty and staff working in the Cooperative Extension division.

Cooperative Extension maintains offices in all 72 Wisconsin counties with educators who specialize in one or more program areas. These educators excel in leadership development, consensus building, and organizational development. University specialists at UW campuses serve as resources to these county educators. High-priority programs focus on economic development, water quality, solid and hazardous waste management and recycling, families and youth at risk, and helping Wisconsin's agricultural industry remain profitable and productive.

The UW-Extension Mission

"Through the University of Wisconsin-Extension, all Wisconsin people can access university resources and engage in lifelong learning, wherever they live and work."



A central role of UW-Extension professionals is to provide research-based programming, technical expertise, and leadership in response to community needs. Specifically, Cooperative Extension educators deliver education where people live and work – on the farm, in schools and community centers, etc. UW-Extension educators also speak to civic groups and county boards, write newspaper columns, do radio and TV programs, facilitate meetings, and build coalitions to solve community problems. To reach a wider audience – and make it easy for those in remote areas to "attend" programs – Cooperative Extension also uses satellite technology, teleconferencing, and interactive video to link people around the region.

UW-Extension educators come from a variety of backgrounds and have diverse educational and technical experiences. Communities often call upon UW-Extension educators to supply technical expertise in planning and decision-making processes; often, UW-Extension educators serve as the primary point of contact for involved citizens and elected officials. As such, UW-Extension is uniquely suited to play an important role in increasing public understanding of Wisconsin's comprehensive planning ("smart growth") law, the consequences and impacts of development, alternative ways of managing growth, and in building consensus regarding land use solutions appropriate to Wisconsin. Cooperative Extension, in particular, has a long history of being active in public education related to land use planning and natural resource management. It has also been involved in community economic development education.

A variety of available computer tools can assist UW-Extension educators in carrying out UW-Extension's educational programming related to Wisconsin's comprehensive planning law and related land use issues. A separate discussion paper, "Computer Tools and UW-Extension Educational Programming in

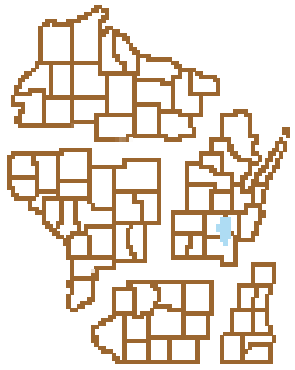
Comprehensive Planning" (Appendix A) describes briefly how computer tools relate to accepted principles for UW-Extension involvement in local planning and the roles that county and campus-based faculty can assume in such planning.

Wisconsin DNR Program Staff – The Wisconsin DNR is responsible for implementing state laws and, where applicable, federal laws that protect and enhance natural resources. It is the one agency charged with full responsibility for coordinating the many disciplines and programs necessary to provide a clean environment and a full range of outdoor recreational opportunities for Wisconsin citizens and visitors.

Organizationally, the agency is made up of six divisions (see box at right). To carry out the policies of each of the six programs so that the needs of local citizens can be best met, the agency divides the state into five administrative regions (see box below right).

DNR Program Divisions

Air and Waste
Land
Forestry
Water
Customer and Employee Services
Enforcement and Science **and Science**



DNR Administrative Regions

Staff in the Wisconsin DNR's Central Office (located in Madison) work with the Natural Resources Board to establish policies and programs, administer state laws and rules, distribute grants and loans, interact with the Governor, Legislature, other agencies, and interest groups, support DNR field responsibilities, and evaluate progress toward agency goals.

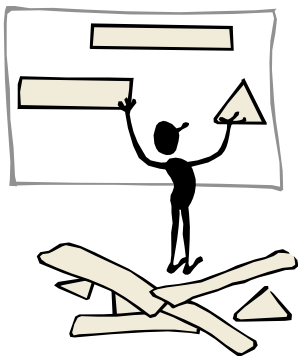
More than two-thirds of Wisconsin DNR's workforce is assigned to field offices in the five regions. Throughout each region, geographically based work teams draw expertise from different disciplines and combine their efforts with county, city, and town leaders, business owners, private homeowners and landowners, outdoor enthusiasts, young people, and other state residents to manage public resources. Regional staff members are responsible for understanding their area's ecology and identifying local threats to natural resources and the environment. These staff members come from a variety of backgrounds, possess diverse educational and technical experiences, and sometimes have limited experience working with land use or planning issues. Nonetheless, communities often call on these individuals to advise citizens and decision makers about environmental and conservation concerns. Staff members rely upon their technical expertise to provide sound information. Computer tools can expedite and enhance the service that DNR staff members provide the public.

Planners – Planners play an essential role in shaping Wisconsin's landscape. They coordinate public and private interests to develop a community vision for the future. Planners help shape the economy, social community, and the environment via the processes they guide and the documents they help create, both of which provide a rational basis for land-use decision making. Planners employ processes that involve defining problems and opportunities, setting goals, generating alternate strategies, choosing appropriate strategies, implementing planned strategies, and evaluating progress toward plan goals. Sound planning has always been an important means of ensuring a community is able to meet its future needs while providing for present quality of life.

A current emphasis on planning is especially pertinent. In 1999 Wisconsin passed legislation that mandates all local governments who make decisions affecting land use to create and adopt comprehensive plans. The

law sets up a framework for the structure of a comprehensive plan requiring communities to address nine general elements, but does not prescribe any particular policies or principles, sound or otherwise and the state holds no authority over the contents or quality of adopted the plans.

The Wisconsin DNR recognizes the significant long-term impact sound planning can have on preserving and managing a community's natural resources and protecting an area's environmental quality. Computer tools can help effectuate sound planning. Therefore, it is imperative that the Wisconsin DNR technical assistance program target the two groups that effect the planning process most directly, professional planners and citizen planners.



Professional planners typically have academic training in the following aspects of planning:

- Structure and function of cities and regions
- History and theory of planning processes and practices
- Administrative, legal and political aspects of plan making
- Public involvement and dispute resolution techniques
- Research design and data analysis techniques
- Written, oral, and graphic communication skills
- Ethics of professional practice
- Collaborative approaches to problem solving

Professional planners use their academic training and expert skills to help communities understand their current conditions and define a future vision. They often use specialized tools to guide those processes.

Citizen planners typically volunteer their time to help influence and guide the future for their communities, and may or may not have planning education or experience. Often, they participate in their town or city planning organization because they are concerned about factors that comprise their quality of life. These commissions advise their local governing body on comprehensive planning and land use issues and may make related decisions that are delegated by the governing body.

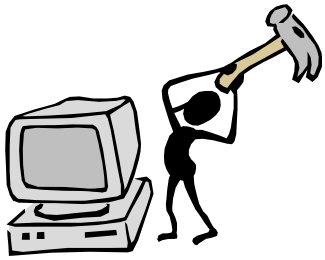
Local Decision Makers – A wide range of "actors" get involved in local land use decision making. Individual landowners, realtors and developers, investors, local governments, regional planning commissions, tribal governments, and state and federal agencies all play a role in decisions that affect land use. The vast majority of land in Wisconsin is, and will remain, privately owned, however, making individual landowners and developers some of the principal land-use decision makers.

In Wisconsin, the primary administrator of land use *regulation* is local government through its planning and zoning powers. Cities, villages, towns, and counties can adopt comprehensive zoning and land use regulations, although some communities have chosen not to[5]. Community plans can establish guidelines and standards to follow when making long-range, local development decisions, while zoning maps and ordinances designate the types of allowable uses on specific pieces of land. Public planning and zoning processes play an important role in guiding desirable growth, while protecting resources. Decision makers involved in these local processes include elected officials, local government staff members (in a variety of departments like public works, assessor's offices, parks, and solid waste), and appointed advisory bodies.

One particularly important group of local decision makers is a community's zoning board of adjustment. These quasi-judicial bodies apply local ordinances and related state laws to specific development proposals in three general categories: administrative appeals, variances, and special exceptions/conditional uses. People of diverse backgrounds comprise these boards. These may include citizen volunteers with no connection to the planning profession, architects, university professors, business and civic leaders, and neighborhood activists. Past research in Wisconsin demonstrated that these individuals want to make sound decisions that consider environmental consequences.

[5] Fifty-seven of Wisconsin's 72 counties have county-wide zoning. Seventy-one percent of Wisconsin towns operate under zoning ordinances, and all but three Wisconsin cities have zoning ordinances.

Change as an Outcome of Technical Assistance



Changing the ways computers support planning.

Implicit in nearly all education programs (and each of the five program purposes outlined previously) is the expectation of change as an outcome or result. In order to be successful in affecting change, however, program planners must consider a number of factors when designing and implementing programs. This section briefly describes how change relates to education programs and outlines steps we took to address certain factors when developing Wisconsin DNR's technical assistance program.

Contemporary program planning literature outlines three types of change that education programs foster:

1. Individual change related to acquiring new knowledge, building skills, and examining personal values and beliefs.
2. Organizational change resulting in new or revised policies, procedures, and ways of working.
3. Community and social change that allows for differing segments of society to respond to the world around them in alternative ways.

The Wisconsin DNR technical assistance program focuses on all three types of change. First, the program will help participants develop practical knowledge and skills. For example, the learning outcomes for all target audiences include being able to identify computer tools that can be used in day-to-day work, as well as demonstrating the skills needed to use specific computer tools proficiently. We also hope to cultivate organizational changes. Specifically, the technical assistance program will encourage modifications in the types of assistance DNR staff and UW-Extension educators provide local communities. We also hope to foster change in the manner in which local government officials make decisions by encouraging the use of science-based tools in local processes. Finally, the technical assistance program will foster change in the ways that citizens participate effectively in local processes. The use of computer tools can give voice to those not usually heard, including those who may depend on particular environmental resources for their health, livelihood, and quality of life.

Factors Leading to Successful Technology Transfer – When developing Wisconsin DNR's technical assistance program, we took steps to address three specific factors that have been identified as being critical to the success of adult learning programs (see "References and Background Material" section for key information sources).

> *Change is a process and not an event. In other words, change is not accomplished by having a one-time announcement by an executive leader, a two-day workshop… and/or the delivery of [equipment or other resources]. Instead change is a process through which people and organizations move as they gradually come to understand, and become skilled and competent in the use of new ways.*
>
> - Hall and Hord 2001

First, in order for education programs to result in change, concrete and workable transfer of learning plans must be developed and carried out. Such plans require technical assistance providers to identify clearly what is to be transferred: knowledge, skills, attitudes, and beliefs. Along these lines, we sought to articulate specific learning outcomes for each target audience within the context of a broader conceptual framework (see "Conceptual Framework and Learning Outcomes" section).

Second, contextual factors that affect the change process, such as political and economic realities, must be taken into account. As we developed the conceptual framework and articulated learning outcomes, we considered the factors unique to each target audience. For example, we acknowledged the various roles and

responsibilities that Cooperative Extension educators fulfill by building on an existing document and articulating the relationship between computer tools and the principles and roles that UW-Extension has defined relative to its programming (see discussion paper "Computer Tools and UW-Extension Educational Programming in Comprehensive Planning" (Appendix A)). We also examined the *You, Extension, and Success* (*YES!*) competency-based professional development system put together by Texas Extension. A set of core competencies forms the foundation for *YES!* These were built from focus groups and interviews with Extension faculty; the competencies describe the knowledge, skills (including technical skills), and attributes that they believe make Extension employees successful in their jobs. While not specific to Wisconsin, this program provides insights into the broader Extension culture. For more focused insight related to UW-Extension's professional development needs, we examined Cooperative Extension's "Career Development Model" (available on the web at www.uwex.edu/ces/nco/competencies.cfm). Finally, we looked at recent evaluation efforts undertaken by UW-Extension (e.g., the article "Evaluating Extension-based water resource outreach programs: are we meeting the challenge?" which appeared in the *Journal of Extension* in 2002) and the commentaries on extension educational approaches and philosophies published in recent issues of the *Journal of Extension.*

Finally, to ensure success, planned assistance and support must be an integral part of technology transfer programs. At this point, we have not yet outlined how Wisconsin DNR will provide follow up support as part of the technical assistance program. As we carry out technical assistance workshops, we will engage participants in defining post-training support needs. We will also look to our institutional partners (e.g., UW-Extension Center for Land Use Education, UW Land Information and Computer Graphics Facility, etc.) for advice and counsel on what capacities must be developed to accomplish successfully our program objectives. The development of further assistance and support approaches will, in part, depend on the availability of financial support.

Technical Assistance Program Objectives

Individuals and local governments make most decisions affecting the quality of the environment. The technical assistance program works to enable people involved in local land use planning and decision making to use science-based computer tools to inform their planning and decision making and consider priority environmental issues.

The Wisconsin DNR technical assistance program seeks to improve decisions by using computer tools to support processes that are iterative, integrative, and participative.

Consistent with contemporary program planning approaches and adult learning theories, we ensured that both measurable and non-measurable program outcomes were included in the technical assistance program. The Wisconsin DNR's application for funding included the following program objectives:

- Increase use of data and decision support tools in local comprehensive planning processes.
- Increase natural resource management and environmental protection in local comprehensive plans.
- Increase use of data and decision support tools in land use decisions at the local level.
- Increase natural resource and environmental protection considerations in local decisions.
- Increase participation in local land use planning and decision making.
- Increase coordination, access, and cooperation between federal and state resources.

Using these program objectives as a base, we developed a conceptual framework and learning outcomes that reflect what participants will learn, the resulting changes from that learning, and the operational aspects of the technical assistance program.

Conceptual Framework and Learning Outcomes

The conceptual framework (Table 1) builds on a recognized learning and instructional model used widely in the development of environmental education curricula. A fundamental underlying concept of this model is that learners move along a continuum of learning from perceptual awareness to informed action. Along the way, learners develop attitudes, knowledge, and skills (often collectively referred to as competencies).

In developing learning objectives, we considered a variety of contextual issues and acknowledged current theories about adult learning.

Specific key principles of adult learning that we considered when developing the framework include:

1. Adults have a rich background of knowledge and experience and learn best when this experience is acknowledged and new information and skills build on their past knowledge and experience.
2. Adults are not likely to willingly engage in learning unless the learning is meaningful to them.
3. For the most part, adults are pragmatic in their learning. They want to apply their learning to present situations.

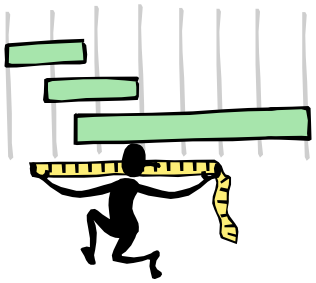


Table 1 presents the conceptual framework and learning outcomes for the Wisconsin DNR technical assistance program. In developing Table 1, we first used brainstorming techniques to identify and list a full range of awareness, knowledge, skills, and actions that all four target audiences "could" learn. We then organized these outcomes under the "awareness," "knowledge," "skills," and "action" headings (structuring outcomes in this manner fosters a logical progression of learning).

Next, we identified a subset of concepts that each audience "should" learn. These learning objectives are indicated with an "X" in Table 1. Consistent with current educational approaches, learning objectives for the different audiences fall into five major categories of learning outcomes:

1. Acquisition of knowledge
2. Enhancement of cognitive skills
3. Development of psychomotor skills
4. Strengthening of problem-solving and finding capabilities
5. Changes in attitudes, values, beliefs, and/or feelings

Generally, a mix of outcomes is included under the "awareness," "knowledge," "skills," and "action" headings for each audience.

Finally, we identified those attitudes, concepts, skills, and actions that each audience "must" learn in order for the objectives of the Wisconsin DNR technical assistance program to be considered successful. These objectives are identified with a boldfaced "**X**" and are shaded in gray in Table 1.

In deciding what participants "should" and "must" learn, we took into consideration a variety of economic and political factors. For example, the U.S. EPA's Office of Wetlands, Oceans, and Watersheds provided funding for the Wisconsin DNR technical assistance program. In addition, the State's forest mill taxes and nonpoint source water pollution control funding support the UW-Extension's basin educator positions. Therefore, a stronger emphasis was placed on tools that address forestry and water quality issues in the objectives for UW-Extension agents and DNR staff. Similarly, we emphasized tools developed by the U.S. EPA and Wisconsin DNR for all audiences.

Since DNR staff members serve functionally as consultants to local government staff and decision makers, we place a greater emphasis on awareness and knowledge of a broad spectrum of tools and their applications and a lesser emphasis on the skills needed to use most of the specific tools. Similarly, because UW-Extension's primary focus is on education, we place an emphasis on UW-Extension educators developing technology transfer skills (i.e. an ability to convey information about tools to others).

Table 1. Conceptual Framework and Basic Learning Outcomes for DNR Technical Assistance Program

	Extension Educators (basin educators, CNRD agents, etc.)	**DNR Regional Program Staff**	**Planners** (professional and citizen planners)	**Local Government Decision Makers** (elected and staff)
Awareness				
Participants will be able to:				
- Describe various types of available tools and technologies				
- Data access and data provision tools	**X**	X	X	X
- Interactive mapping tools	**X**	X	X	X
- Data analysis and predictive modeling tools	**X**	X	X	X
- Explain the concepts of planning and decision support tools	**X**	**X**	**X**	X
- Identify resources for accessing tools				
- County Land Information Surveys	X	X	X	
- Midwest Spatial Decision Support System Partnership	**X**	**X**	**X**	X
- Wisconsin DNR web site	**X**	**X**	**X**	X
- PlaceMatters.com	**X**	**X**	**X**	X
- LICGF Community Planning Resource	**X**	X	X	X
- Describe the benefits and limitations of using decision support tools	**X**	X	**X**	X
Knowledge				
Participants will be able to:				
- Identify specific tools available for use in Wisconsin				
DATA ACCESS AND DATA PROVISION TOOLS				
- WISCLINC	**X**	X	**X**	
- ATRI – Metadata Explorer	**X**	**X**	X	X
- Natural Heritage Inventory Online Database	**X**	**X**	**X**	**X**
- WisAHRD	X		**X**	**X**
- Wisconsin Coastal Image Server	**X**	**X**	X	
- Environmental Remote Sensing Center web site	X	**X**	X	
- Window to My Environment	**X**	**X**	**X**	**X**
- Geospatial One-Stop	X		**X**	
- National Geospatial Clearinghouse	X		**X**	
- Soils Data Mart	X	**X**	**X**	
- USDA Geospatial Data Gateway	X	**X**	**X**	
- WATERS	X	X		
- EPA AirData	X	X		
- EGIS	X		X	
- Applied Population Laboratory's WisStat	**X**	X	X	

Table 1, Continued

	UW-Extension	DNR	Planners	Decision Makers
Knowledge, Continued				
- Identify specific tools available for use in Wisconsin, Continued				
INTERACTIVE MAPPING TOOLS				
- ATRI – Comprehensive Planning Web Mapping Site	**X**	**X**	**X**	**X**
- DNR WebView Site	X	**X**	X	
- DNR Dam Safety Site	X	**X**		
- DNR Floodplain Analysis Database Site	X	**X**		
- DNR Registry of Closed Remediation Site	**X**	**X**	X	
- UW Botany Dept. BioMapper	X	**X**		
- EnviroMapper for Water	**X**	**X**	X	X
- National Map On-line Map Service	X		X	
- National Wetlands Inventory Mapper	**X**	**X**	X	
ANALYSIS AND PREDICTIVE MODELING TOOLS				
- CITYgreen	X			
- CommunityViz	X		X	
- Digital Watershed	**X**	**X**	**X**	X
- Water Erosion Prediction Project	X			
- L-THIA	**X**	**X**	**X**	X
- TURM	X			
- What if?	X		X	
- Uplan	X		X	
- PLACE^{3}S	X		X	
- TRANSIMS	X		X	
- Explain how tools can be used in each step in the planning process				
- Visioning (e.g., CommunityViz, CITYgreen, …)	**X**		**X**	**X**
- Inventory (e.g., ATRI, NHI, Window to My Environment…)	**X**	X	**X**	**X**
- Analysis (e.g., L-THIA, ATIOD, …)	**X**	X	**X**	**X**
- Alternatives Selection (e.g., L-THIA, What if?, …)	**X**	X	**X**	**X**
- Implementation and Monitoring (e.g., TURM, WATERS, CommnityViz, CITYgreen, …)	**X**		**X**	**X**
- Plan Updating (e.g., Dane INDEX, Place IT, …)	**X**		**X**	**X**
- Explain how tools can be used in other types of land use decisions				
- Special use permits	X		X	X
- Zoning classifications and variances	X		X	X
- Subdivision platting (L-THIA, …)	X		X	X
- Site design (L-THIA, …)	X	X	X	X
- Road siting and expansion	X	X	X	X
- Transportation infrastructure improvements	X	X	X	X
- Sewer service area extensions (L-THIA, …)	X	X	X	X
- Land acquisition (ATRI, Digital Watershed, L-THIA, …)	X	X	X	X

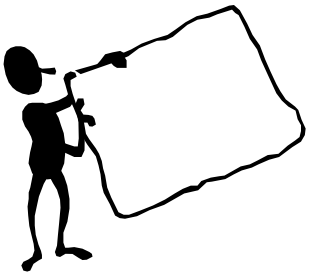
Table 1, Continued

	UW-Extension	DNR	Planners	Decision Makers
Knowledge, Continued				
Participants will be able to:				
- Explain how tools can be used in other types of land use decisions, Continued				
- Recreational facilities development	X	X	X	X
- Facilities siting (ATRI, L-THIA, …)	X	X	X	X
- Trail opportunities	X	X	X	X
- Identify appropriate tools for specific environmental issues				
- Watershed planning	**X**	**X**	X	X
- Non-point run off	**X**	**X**	X	
- Storm water, flooding	**X**	**X**	X	X
- Groundwater recharge		X	X	
- Wetland protection and restoration		X	X	
- Shoreland management and restoration	**X**	**X**	X	
- Air emissions		X		
- Greenhouse gases/global warming		X		
- Urban forestry	**X**	**X**		X
- Tree canopy	**X**	**X**		
- Forest fragmentation	**X**	**X**		
- Invasive and exotic species		X		
- Wildlife management	X	X		
- Noise pollution		X	X	X
- Light pollution		X	X	X
- Historic preservation	X		X	X
Skills				
Participants will be able to:				
- Convey basic information about tools, tool use, and tool resources	**X**	**X**	X	
- Use specific tools proficiently				
DATA ACCESS AND DATA PROVISION TOOLS				
- WISCLINC	**X**	X	**X**	
- ATRI – Metadata Explorer	**X**	**X**	**X**	X
- Natural Heritage Inventory Online Database	X	**X**	**X**	X
- WisAHRD			X	
- Wisconsin Coastal Image Server	X	X	X	
- Window to My Environment	**X**	**X**	**X**	X
- Soils Data Mart		**X**	**X**	
- WATERS		X	X	

Table 1, Continued

	UW-Extension	DNR	Planners	Decision Makers
Skills, Continued				
Participants will be able to:				
- Use specific tools proficiently, Continued				
INTERACTIVE MAPPING TOOLS				
- ATRI – Comprehensive Planning Web Mapping Site	**X**	**X**	**X**	**X**
- DNR WebView		X		
- DNR Dam Safety Site	X	**X**	**X**	
- DNR Floodplain Analysis Database Site	X	**X**	**X**	
- DNR Registry of Closed Remediation Sites	X	**X**	**X**	
- EnviroMapper for Water	**X**	**X**	**X**	**X**
ANALYSIS AND PREDICTIVE MODELING TOOLS				
- CommunityViz	X		X	
- Digital Watershed	**X**	**X**	**X**	
- L-THIA	**X**	**X**	**X**	**X**
- What if?	X		X	
Action				
Participants will:				
- Convey information about tools to others:				
- Describe various types of available tools and technologies	**X**	**X**	**X**	
- Identify resources for accessing tools	**X**	**X**	**X**	
- Describe the benefits and limitations of using decision support tools	**X**	**X**	**X**	**X**
- Identify specific tools available for use in Wisconsin	**X**	**X**	**X**	
- Explain how tools can be used in each step in the planning process	**X**	X	**X**	
- Explain how tools can be used in other types of land use decisions	**X**	X		X
- Identify appropriate tools for specific environmental issues	**X**	**X**	**X**	
- Use tools in the planning process	**X**	**X**	**X**	**X**
- Use tools in other land use decision processes	**X**	**X**	**X**	**X**
- Encourage others to use tools in decisions	**X**	**X**		
- Evaluate their use of tools in decisions	X		X	X
- Share experiences with technical assistance providers (i.e. Wisconsin DNR, UW-Extension, etc.)	X	X	X	X

Instructional Plans and Techniques



Specific instructional techniques for meeting learning objectives have yet to be developed. Pedagogical approaches for the technical assistance program will be designed based on learning outcomes, the capability and availability of instructors, learning context, target audience characteristics and needs, and available resources. We plan to use active learning techniques and incorporate contextual learning as part of our approach (for example, learners will be given opportunities to try out new skills in settings similar to ones they work in). We will determine what strategies and techniques are the most useful in helping each target audience apply what they have learned to their personal work activities. As one writer notes, "a successfully designed learning experience increases the learner's ability to participate in the world around them." We will assess needs of each target audience using a variety of methods, such as ethnographic interviews and detailed surveys. In addition, we will use formative evaluation techniques to assist instructors so that they adequately address learning transfer aspects of the program. We will also provide job aids and other technology transfer resources. Finally, we will allow each target audience opportunities to develop specific application plans and assist them in assessing barriers and enhancers to learning transfer unique to their individual situation. See "References and Background Material" section for key information sources related to instructional techniques.

References and Background Material

Items followed by an asterisk (*) were particularly useful in shaping our approach to developing the conceptual framework and learning outcomes and understanding our target audiences.

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Appendix A:

Discussion Paper on Computer Tools and UW-Extension Educational Programming

Computer Tools and UW-Extension Educational Programming in Comprehensive Planning

A Discussion Paper

> *UW-Extension is your high-tech, hands-on partner in lifelong learning.*
>
> - Kevin P. Reilly, Chancellor, 2000-2004

A variety of available computer tools (e.g., web-based data access tools, interactive web mapping tools, decision support and modeling tools, etc.) can assist Extension educators in carrying out UW-Extension's educational programming related to Wisconsin's comprehensive planning ("smart growth") law. This paper describes briefly how these tools can relate to accepted principles for UW-Extension involvement in local planning and the roles that county and campus based faculty can assume in such planning. "Principles" and "roles" are extracted from the UW-Extension document titled "Extension Educational Programming in Comprehensive Planning" (available online at www.uwex.edu/ces/cnred/pdf/edprogrm.pdf). Thoughts about how computer tools can support the principles and roles are offered as a starting point for discussion only and at this time do not necessarily reflect consensus thinking on this topic.

UW Extension *Principles for UW-Extension Involvement*

Principle: "Comprehensive planning must be inclusive, rather than exclusive and exclusionary. Planning, to be effective and fair, requires a sense of citizenship and an appreciation of the inter-dependency and shared interests of urban, suburban, and rural areas. Similarly, it requires that current residents be encouraged to think not only of their needs and interests, but also of the needs and interests of future generations of citizens."

How Computer Tools Relate: Computer tools, particularly web-based tools with data and models embedded within, can help ensure that participants in a planning process have equal access to information and analysis tools. Many of these tools can provide the capacity needed to understand and model complex interrelationships. Such tools can help ensure a "level playing field," by giving voice to those who might lack technical or scientific background or otherwise feel at a disadvantage in having their voices heard (i.e. "citizen scientists," "citizen planners," and other concerned citizens can be a part of community decision-making processes). Ready access to a variety of types of information from varying sources fosters the ability for plan participants to identify inter-dependencies and shared interests. Tools performing complex analyses often have user friendly, intuitive interfaces and require simple or no data inputs. The straightforward outputs from these tools can be easy to understand and can foster public participation.

Principle: "In making decisions about land use and development, communities need to consider social and environmental consequences as well as economic impacts, and must consider long-term as well as short-term consequences."

> **How Computer Tools Relate:** Some computer tools have been designed specifically to predict impacts (e.g., changes in storm water runoff quantity and quality, changes in tax base, energy savings from urban forest canopy, etc.). Such tools can enhance local decision making by more fully disclosing short-term, long-term, and secondary consequences of decision options. Results from these types of tools can prove useful to both decision makers and concerned citizens.

Principle: "An important part of planning is respecting and preserving historic, cultural, and environmental resources that enhance community identity and sense of place."

> **How Computer Tools Relate:** During the inventory stage of plan development, computer tools can be used to access and acquire information about existing resources (e.g., historic buildings, archaeological sites, endangered species habitats, wetlands, etc.). Other tools can be used to predict impacts on valued resources (e.g., changes in storm water runoff quantity and quality, increases in greenhouse gas emissions, etc.). Interactive mapping, predictive modeling, and visual imaging tools can help foster a sense of place by helping plan participants develop visual and graphic representations of their community and its assets.

Principle: "Comprehensive planning must incorporate the principles of hazard mitigation and community sustainability to help insure that plans, policies, and decisions eliminate or reduce the potential impact of natural and other hazards."

> **How Computer Tools Relate:** In the inventory and analysis stages of plan development, computer tools can be used to access information about potential hazard areas (e.g., floodplain locations, contaminated sites, etc.) so that those hazards can be considered during the selection of plan alternatives. During plan implementation, computer models can help predict the consequences, including hazards, resulting from various land use decisions. Tools are now available to assess water quality, air quality, energy consumption, and related impacts of decisions. Knowing about potential impacts up front allows community decision makers to foster sustainable local decisions.

Principle: "Public education is needed to make citizens aware of public policy choices related to how growth is managed and to encourage citizens to participate in processes and initiatives at the local, county, state, and federal levels aimed at developing plans and policies related to land use and development."

> **How Computer Tools Relate:** Computer tools represent current technology that is not adequately brought to bear in public participation or local decision-making processes. Such tools can help illuminate the varied consequences of public policy choices (also see "Role as Educator," page 3). Computer tools can support and inform facilitation and consensus building processes that lead to public policy choices. They can also enhance the quality of discussion about local land use and land use choices.

County/Campus Based Faculty Roles

Depending on the local situation, county and campus based Extension faculty may assume a variety of roles in comprehensive planning: educator, convener, facilitator, catalyst, researcher, information provider, collaborator, etc.

Role as Educator: Extension educators can:

- "Provide a wide range of information and education programs through workshops and locally based programs, web-based and printed educational materials, newsletters, distance learning opportunities, radio and television programs, and videos.
- Serve as a source of information for local governments by teaching on a wide range of land use-related topics, such as comprehensive and strategic planning, alternative ways of involving citizens in planning and visioning, zoning and land use regulation.
- Advise and assist county and local governments in establishing model planning processes to meet local needs."

How Computer Tools Relate: Computer tools can help educators translate complex jargon, issues, and designs into a common visual language that all participants in a planning process can understand and discuss. They can be an integral part of Extension pedagogy. Computer tools can also be the focus of Extension programs that cover the environmental or planning issues that specific computer tools address (e.g., non-point source pollution), how specific tools work, how tools can be used to support and enhance community involvement processes, how tools can be applied in planning and decision making, etc. Extension educators can help local officials effectively integrate computer tools into local processes–highlighting the ease-of-use and understandable outputs–to address specific local concerns or needs.

Role as Convener, Facilitator, and Catalyst: Extension educators can:

- "Provide forums for the discussion of development-related issues, including controversial issues that pose difficult public choices.
- Allow competing views to be debated.
- Encourage local planning and problem solving related to land use, development, and preservation.
- Help communities build consensus on how to accommodate growth and change."

How Computer Tools Relate: Computer tools can be used to aid facilitation and consensus building techniques. Typically, more than one decision maker (or interest group) is involved in the decision-making process. Often these decision makers have different preferences with respect to the relative importance of decision criteria and resulting consequences. When all information and issues are made "transparent" and "understandable" to the range of stakeholders involved, more fruitful discussion and effective consensus-building can occur in a public participation setting. Computer tools can allow parties to understand the likely impacts and help users to make informed decisions that reflect the various tradeoffs associated with alternatives.

Role as Applied Researcher: Extension educators can:

- "Conduct applied research on specific local comprehensive planning and land use issues.
- Prepare case studies of plans and policies attempting to manage and shape growth and development, with special attention to regional, county and local plans and policies that seek to balance competing economic, social, and environmental objectives.
- Evaluate alternative approaches and processes of undertaking comprehensive planning.
- Assess effectiveness in terms of involving citizens in decision-making processes, in achieving consensus on difficult policy questions, and in terms of effectiveness in regulating and channeling growth. Transmit lessons and insights gained to other communities."

How Computer Tools Relate: Because many computer tools have arrived on the planning scene only recently, their effectiveness for involving citizens in decision making, for helping achieve consensus on difficult policy questions, and for helping regulate and channel growth has not been extensively evaluated. The use of computer tools in local planning and decision making, however, provides alternatives to traditional decision-making processes and has the potential to greatly improve local processes. Extension staff can fulfill critical roles in witnessing the prevalence of tool usage at the local level and assessing the quality of the resulting plans and land use decisions. At this point, however, such evaluation of tool use remains rare.

Role in Information Transfer and Collaboration: Extension educators can:

- "Recognize issues of statewide significance, and communicate experience and knowledge gained at the local and county levels to state agencies with program responsibilities related to land use and growth management.
- Encourage discussion and refinement of proposals to strengthen and improve institutions, processes and tools of planning and growth management in Wisconsin."

How Computer Tools Relate: Extension faculty members are in a unique position to help state and federal agencies in evaluating their data access and data provision tools. Extension faculty members have opportunities to communicate the experiences of communities that apply computer tools to local environmental issues like development of total maximum daily load (TMDL) analyses, compliance with storm water regulations, protection of endangered resources, etc. Extension faculty members have an opportunity to help define and direct the Wisconsin Department of Natural Resources' technical assistance efforts to ensure they address issues of local and statewide importance.

This discussion paper was prepared to support a Wisconsin Department of Natural Resources technical assistance program focused on computer tools for planning, conservation, and environmental protection.